

Femoral head and neck excision in a dog that had previously undergone contralateral hind limb amputation

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- Because femoral head and neck excision is reportedly more successful in smaller, lighter dogs, it would generally be considered to be contraindicated in dogs that have previously undergone hind limb amputation because of the additional weight borne by the remaining hind limb.
- Femoral head and neck excision should be considered in dogs with coxofemoral arthritis that have previously undergone contralateral hind limb amputation if other options are not feasible.

Two male 6-week-old German Shepherd Dog littermate pups were referred for evaluation and treatment of left hind limb abnormalities that had first been noticed 3 weeks earlier. The pups' dam had not had any apparent problems during pregnancy or whelping. The pups were the only members of the dam's second litter and seemed healthy at birth. The dam was in good health and had been given a calcium/vitamin supplement during pregnancy. During lactation, supplemental food (ground beef, liver, poultry meat, and commercial high-protein baby food) was available to the pups and dam. The whelping box was lined with newspapers spread over linoleum flooring to simplify cleanup.

An abnormal gait was first noticed when the pups were about 3 weeks old. At that time, the pups scooted, rather than walked. The referring veterinarian prescribed passive range of motion exercises (20 to 30 cycles, 3 times/d) to help restore mobility to the left stifle joints, but the pups did not improve.

On physical examination, the pups appeared healthy, except that, in each pup, the left hind limb was fixed in extension and could not be manually flexed. The pups had difficulty in rising and held the affected limb in internal rotation when standing. There was cutaneous sensation to the left hind paw in each pup, but the left patellar reflexes could not be evaluated. Radiographically, the stifles appeared normal. On pelvic radiographs of each pup, luxation of the left coxofemoral joints was evident. Quadriceps contracture with coxofemoral luxation was diagnosed. Because of the poor prognosis for restoration of function, amputation of the left hind limb was recommended. The owner donated the pups to the teaching hospital, and the limbs were amputated by means of disarticulation of the left coxofemoral joints.¹ The pups recovered without difficulties; both pups were adopted by new owners.



Figure 1—Photograph of the sling used to assist walking in a dog that underwent left hind limb amputation and right femoral head and neck excision.

At 6 months of age, 1 of the pups began to have signs of increasing difficulty and discomfort while getting up and walking. Signs of pain were evident during manipulation of the coxofemoral joint, and muscles of the right hind limb appeared moderately atrophied, compared with normal. An Ortolani's sign, which is indicative of coxofemoral joint laxity, could be elicited.² Radiography revealed coxofemoral subluxation. The acetabulum was shallow and irregular. Radiographically, the littermate also had subluxation of the coxofemoral joint, but this pup did not have clinical signs of lameness.

Because the first pup's ability to rise and walk was worsening, surgical intervention was offered to the owner. Surgical options that were considered included total hip replacement, triple pelvic osteotomy, and femoral head and neck excision.³⁻⁵ Of these, femoral head and neck excision appeared to offer the best chance for success, given the dog's age and the severe arthritic changes in the joint. Because dogs with good muscle tone are thought to have better results following femoral head and neck excision,⁵ a physical therapy program designed to maintain muscle mass and improve muscle tone was initiated. The owner was instructed to walk the dog daily and to use a towel as a sling to help support the dog's hind end.

Surgery was performed 2 weeks later. A bone saw was used to excise the femoral head and neck at the neck-shaft junction. During the first 2 weeks after surgery, exercise was limited to short, assisted walks. Using a custom-made sling with long handles (Fig 1), the owner gradually increased the walking distance to 3 miles. Three months after surgery, the dog could walk 3 miles unassisted and could run without apparent discomfort. On radiographs taken at that time, there was a

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moderate amount of new bone formation at the excision site.

The dog did well for more than 4 years after surgery. When it was 5 years old, the dog was euthanatized because of unacceptably aggressive behavior that apparently was a result of an overprotective attitude toward its owner. The littermate had not had any problems referable to the coxofemoral joint during this period.

The cause of quadriceps contracture in these 2 pups was unclear. Early luxation of the coxofemoral joint has been reported to cause quadriceps contracture,⁶ and in people, fetal malpositioning can cause laxity or even luxation of the coxofemoral joint.⁷ Toxic and infectious causes seemed to be unlikely in these pups because only the left hind limb of each pup was affected. Developmental problems associated with supplementation of the dam and pups may have contributed to abnormally rapid growth, but such conditions also are usually generalized, rather than localized. Trauma resulting from poor footing provided by the newspaper bedding cannot be totally discounted as a possible contributing factor.

We did not expect these pups to develop right coxofemoral joint laxity following left hind limb amputation. It seems possible that overloading of the right coxofemoral joint may have caused stretching of the joint capsule and synovitis that resulted in excessive synovial fluid production and joint laxity.⁸ However, the well-known predisposition of German Shepherd Dogs toward hip dysplasia also may have been an important factor.

Total hip replacement and triple pelvic osteotomy were not considered to be suitable treatment options for the pup that became lame at 6 months of age. Total hip replacement in skeletally immature dogs carries substantial risk. Pelvic deformities develop because of destruction of growth plates, and such a young dog could possibly outgrow the prosthesis.³ Analgesics may have been effective in managing the dog through its adolescence while awaiting total hip replacement. The dog was considered to be a poor candidate for triple pelvic osteotomy because of erosion of the dorsal acetabular rim and other advanced arthritic changes apparent throughout the joint.⁴

Femoral head and neck excision was chosen, because it neither requires permanent implants nor relies on salvage of arthritic joint surfaces. Femoral head and neck excision is reportedly more likely to be successful in smaller dogs, dogs with minimal muscle atrophy, and dogs in which a program of early vigorous exercise is initiated to establish a functional pseudoarthrosis.^{5,9} Adequate muscle mass is needed to counteract the tendency of the femur to displace proximally when the dog bears weight on the limb.

The degree of recovery of this dog following femoral head and neck excision was unexpected. Success is probably attributable to a combination of the natural resiliency of an adolescent patient and excellent owner compliance with a rigorous pre- and postoperative physical therapy program.

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